

REMARKS

The Present Invention

The present invention relates to a method of planarizing or polishing the surface of a memory or rigid disk and a polishing system useful in practicing the same. Claims 1-34 are pending.

Discussion of the Amendments

The specification has been amended to recite a method of planarizing or polishing "the surface of" a memory or rigid disk. This amendment is supported by claim 1 as originally filed. Claim 17 has been amended so as to depend from claim 2, as supported by the specification, for example, at page 5, lines 22-24. Claim 19 has been amended so as to depend from claim 17 and recite "a source of phosphate ions," as supported by the claims as filed and the specification, for example, at page 5, lines 20-28. Claims 20 and 21 have been amended so as to depend from claim 3, as supported by the specification, for example, at page 5, line 33 – page 6, line 6. Claim 21 also has been amended to correct a typographical error and to recite "a source of phosphonate ions." These amendments are supported by the claims as originally filed and the specification, for example, at page 5, lines 33-35. New claims 28-34 have been added, which are directed to additional aspects of the present invention. These claims are supported by the claims as originally filed and the specification, for example, at page 5, line 33 – page 6, line 6. No new matter has been added by way of these amendments.

Summary of the Office Action

Claims 1-23 and 24-26 have been rejected as allegedly indefinite under 35 U.S.C. § 112, second paragraph. Claims 1-3, 5-10, 12-14, and 17-27 have been rejected as allegedly anticipated under 35 U.S.C. § 102(e) by U.S. Patent 6,190,237 (Huynh et al.) (hereinafter "the Huynh et al. '237 patent"). Claims 4 and 11 have been rejected as allegedly unpatentable under 35 U.S.C. § 103(a) over the Huynh et al. '237 patent in combination with U.S. Patent 6,276,996 (Chopra) (hereinafter "the Chopra '996 patent"). Claims 15 and 16 have been rejected as allegedly unpatentable under 35 U.S.C. § 103(a) over the Huynh et al. '237 patent in combination with U.S. Patent 6,152,976 (Ishitobi et al.) (hereinafter "the Ishitobi et al. '976 patent").

Discussion of the Section 112, Second Paragraph, Rejections

The Office Action alleges that claims 1-23 are indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as their

invention. In particular, the Office Action alleges that claim 1 lacks sufficient antecedent basis for the phrase "the surface of a memory or rigid disk." The Office Action also alleges that claims 17-19 lack antecedent basis for the phrase "the phosphate ion" and, further, that claim 19 lacks antecedent basis for the phrase "the source."

With respect to claim 1, Applicants understand the Office Action to be questioning whether the phrase "the surface of a memory or rigid disk" is adequately supported in the specification (*i.e.*, written description support). Applicants believe that the specification adequately supports the claims, as filed. For example, the specification provides that the method of the present invention comprises "contacting the surface of a memory or rigid disk with [the] polishing system" of the present invention (specification at page 2, lines 19-20). Furthermore, planarizing or polishing any substrate necessarily entails planarizing or polishing a surface of the substrate. Nevertheless, Applicants have amended the specification to more specifically recite planarizing or polishing "the surface of a memory or rigid disk," as recited in the claims as filed. In view of this amendment, the Section 112, second paragraph, rejection is rendered moot with respect to claim 1.

With respect to claims 17-19, Applicants believe that the phrases in each of these claims have antecedent basis in the claims from which they depend. However, in view of the claim amendments set forth above. Accordingly, the Section 112, second paragraph, rejections are moot with respect to these claims.

The Office Action rejects claims 24-26 under Section 112, second paragraph, but does not provide any reasons in support of the rejection. Applicants believe that each of claims 24-26 satisfies the requirements of Section 112, second paragraph. Accordingly, the Section 112, second paragraph, rejection with respect to claims 24-26 is improper and should be withdrawn.

Discussion of Rejection of Claims 1-23 in View of the Cited References

The Office Action rejects claims 1-23 as allegedly anticipated or obvious in view of the Huynh et al. '237 patent, alone and in combination with the Chopra '996 patent or the Ishitobi et al. '976 patent. Applicants respectfully traverse these rejections.

Claims 1-23 are directed to a method of planarizing or polishing the surface of a *memory or rigid disk*. A memory or rigid disk (*e.g.*, magnetic recording disk) is typically a flat plate having a magnetic surface, which is used for storing data (*IEEE Standard Dictionary of Electrical and Electronics Terms* (4th ed. 1988) at 553 (copy enclosed)). By way of contrast, the Huynh et al. '237 patent is directed to a method and composition for polishing *microelectronic devices*, such as integrated circuits (the Huynh et al. '237 patent at col. 1, lines 7-9; col. 3, lines 55-58; col. 5, lines 32-35). A microelectronic device is

typically defined as an item containing inseparable parts and hybrid circuits, usually produced by integrated circuit techniques (*ISEE* at 588 (copy enclosed)). Memory or rigid disks do not contain hybrid circuits and are not manufactured using integrated circuit technology. Thus, memory or rigid disks are not microelectronic devices as that term is generally used. As the Huynh et al. '237 patent does not disclose polishing a memory or rigid disk, it does not disclose each element recited in the pending claims and cannot, therefore, properly be considered as anticipating the claimed subject matter.

Furthermore, nothing in the Huynh et al. '237 patent suggests using the polishing method disclosed therein to polish any substrate other than a microelectronic device, much less a memory or rigid disk, as recited in the pending claims. Those of ordinary skill in the art appreciate that polishing microelectronic devices, such as integrated circuits, involves significantly different technical problems than those encountered when polishing memory or rigid disks. This may be attributed, at least in part, to the significantly different nature of the substrate being polished. For example, microelectronic devices typically comprise surface materials such as copper, aluminum, tungsten, silicon dioxide, and refractory materials (the Huynh et al. '237 patent at col. 5, lines 32-35) that can be significantly different from the surface materials of a memory or rigid disk (e.g., nickel phosphorous). Indeed, the process disclosed in the Huynh et al. '237 patent is expressly limited to polishing the surface materials of microelectronic devices (*id.*). Furthermore, the surface of a microelectronic device often comprises several different types of material that must be polished simultaneously and/or selectively (see, e.g., the Huynh et al. '237 patent at col. 1, lines 20-43). As a result, chemical-mechanical polishing systems and methods used in polishing microelectronic devices, like the method disclosed in the Huynh et al. '237 patent, generally yield undesirable results when used to polish the surface of a memory or rigid disk (see, e.g., the present specification at page 1, lines 13-20).

Given the materially different nature of the substrates involved, one of ordinary skill in the art would not have been motivated to use the method for polishing microelectronic devices disclosed in the Huynh et al. '237 patent to polish or planarize a memory or rigid disk with any *reasonable expectation of success*. At most, the cited references might support the proposition that it would have been obvious to try the combination suggested in the Office Action; however, an obvious to try rationale is insufficient to support an obviousness rejection under Section 103.

The Office Action cites the Ishitobi et al. '976 patent for its alleged disclosure of the use of certain amounts of an oxidizing agent. The Ishitobi et al. '976 patent discloses polishing a magnetic recording disk using a polishing system that is substantially different

from that recited in the pending claims. Specifically, the Ishitobi et al. '976 patent discloses a composition comprising titanium oxide particles and an "abrasion promoter," which comprises gluconic acid, malic acid, or certain aluminum or iron salts. Nothing in the Ishitobi et al. '976 patent suggests any modification to the composition or method disclosed therein that would lead one of ordinary skill in the art to the present invention. Thus, the Ishitobi et al. '976 patent, by itself, does not disclose or suggest the subject matter recited in the pending claims.

Furthermore, the disclosure of the Ishitobi et al. '976 patent cannot properly be combined with that of the Huynh et al. '237 patent or the Chopra '996 patent in such a way as to arrive at the present invention. In order to properly combine two or more references to support an obviousness rejection under Section 103, there must be a clear and particular teaching or suggestion to combine the references, as well as a reasonable expectation that such combination will be successful. *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999); *MPEP* § 2143. The Office Action fails to point to any motivation to combine the teachings of the Ishitobi et al. '976 patent with any other cited reference, nor do the references themselves provide any such motivation. In particular, the Huynh et al. '237 and Chopra '966 patents are specifically directed to polishing microelectronic devices which, as previously discussed, are significantly different from processes for polishing memory or rigid disks (*e.g.*, magnetic disks), such as the process disclosed in the Ishitobi et al. '976 patent. Given the substantial differences between these processes, one of ordinary skill in the art would not be led to combine the disclosure of the Ishitobi et al. '976 patent with the disclosure of the Huynh et al. '372 patent with any reasonable expectation that such combination would be successful.

Even if there was a clear and particular teaching or motivation to combine the disclosures of the Huynh et al. '237 and Ishitobi et al. '976 patents, which there is not, such combination, by itself, would be insufficient to render the claimed subject matter obvious. Specifically, neither the Huynh et al. '237 patent nor any of the other cited references provides any clear and particular teaching to polish a memory or rigid disk using a polishing system that comprises a phosphate or phosphonate ion concentration of about 0.04 M or higher, as recited in the pending claims. The Huynh et al. '237 patent generally discloses a polishing composition that includes 0.0001-100 M, preferably 0.01-0.1 M, of a weak acid component, and discloses a "laundry list" of acids that can be used as the weak acid component including three species of phosphate-containing acids; however, nothing in the Huynh et al. '237 patent, or the other cited references, provides any motivation to choose a phosphate-containing acid over the other disclosed acid species that do not contain phosphates. Indeed, at least with respect to silica-containing

polishing compositions, the Huynh et al. '237 patent states that the most preferred acid component is acetic acid (the Huynh et al. '237 patent at col. 3, lines 29-31). Thus, to the extent the Huynh et al. '237 patent provides any guidance in this respect, it teaches away from the subject matter of the pending claims.

Similarly, nothing in Huynh et al. '237 patent, or the other cited references, provides any motivation to use a phosphate ion concentration of about 0.04 M or higher. Although the acid concentration ranges disclosed in the Huynh et al. '237 patent (e.g., 0.01-0.1 M) overlap the range recited in the pending claims, the present specification clearly demonstrates that the claimed range of about 0.04 M or higher provides an unexpected improvement in polishing performance as compared to lower concentrations covered by the acid concentration range disclosed in the Huynh et al. '237 patent (see, e.g., the present specification at pp. 12-13, Example 3 (showing an increase in the relative polishing rate of about 50% at a phosphate ion concentration of 0.04 M as compared to a phosphate ion concentration of 0.02 M)). The unexpected improvement in polishing owing to the claimed phosphate ion concentration range overcomes any *prima facie* case of obviousness presented by the Huynh et al. '237 patent.

The Office Action cites the Chopra '996 patent for its alleged disclosure of polishing or planarizing metal surfaces and the use of a fixed-abrasive polishing pad. Like the Huynh et al. '237 patent, the Chopra '996 patent's entire disclosure is drawn to the chemical-mechanical polishing of integrated circuits, specifically copper-containing integrated circuits (see, the Chopra '996 patent at col. 1, lines 53-60). Thus, contrary to the Office Action's assertions, the Chopra '996 patent does not teach polishing metal substrates in general; rather, the Chopra '996 patent is directed specifically to the polishing of "copper layers having greater than or equal to 50% molar copper content" (see, e.g., the Chopra '996 patent at col. 2, lines 31-34). Moreover, nothing in the Chopra '996 patent suggests using the method disclosed therein to polish substrates other than integrated circuits that do not contain copper, much less a memory or rigid disk as recited in the pending claims. Thus, the Chopra '996 patent does not provide the missing disclosures of the Huynh et al. '237 or Ishitobi et al. '996 patents, and the Section 103(a) rejection over the Chopra '996 patent in combination with the Huynh et al. '237 patent should, therefore, be withdrawn.

For the foregoing reasons, the Huynh et al. '237 patent, alone or in combination with the Chopra '966 or Ishitobi et al. '976 patents, cannot properly support the Section 102(e) or 103(a) rejections with respect to claims 1-23. Accordingly, the Section 102(e) and 103(a) rejections with respect to these claims should be withdrawn.

Discussion of Rejection of Claims 24-27 in View of the Cited References

The Office Action rejects claims 24-27 as anticipated under Section 102(e) by the Huynh et al. '237 patent. Specifically, the Office Action alleges that the Huynh et al. '237 meets all of the elements of claims 24-27, without providing any more detailed analysis of its position. Applicants traverse this rejection.

Claims 24-27 recite a polishing system comprising (i) a polishing composition comprising about 0.04 M or higher phosphate or phosphonate ion and (ii) silica particles. Contrary to the Office Action's allegations, the Huynh et al. '237 patent does not disclose or suggest a polishing composition comprising about 0.04 M or higher phosphate or phosphonate ions. As previously discussed with respect to claims 1-23, the concentration range of the acid species disclosed in the Huynh et al. '237 patent (*e.g.*, 0.01 M-0.1 M) overlaps the phosphate or phosphonate ion concentration recited in the pending claims; however, the ranges are not the same, nor does the Huynh et al. '237 patent suggest the claimed range with sufficient specificity to anticipate this element of the claim. Furthermore, the present specification demonstrates an unexpected improvement in polishing performance within the claimed range over that exhibited within the range disclosed in the Huynh et al. '237 patent. The unexpected improvement in polishing owing to the claimed phosphate ion concentration range further emphasizes the difference between the claimed range and that disclosed in the Huynh et al. '237 patent and overcomes any *prima facie* case of obviousness presented by the Huynh et al. '237 patent.

Furthermore, also as discussed with respect to claims 1-23, the Huynh et al. '237 patent discloses phosphate-containing acids as one of many acid components which can be used in accordance with the method disclosed therein, but provides no specific guidance with respect to the choice of the phosphate-containing acid species over the non-phosphate containing acid-species. Indeed, with respect to silica-containing polishing compositions, such as recited in the pending claims, the Huynh et al. '237 patent explicitly states that acetic acid is the most preferred acid component, thereby teaching away from the use of a phosphate ion, as recited in the pending claims (the Huynh et al. '237 patent at col. 3, lines 30-32). This deficiency in the disclosure of the Huynh et al. '237 patent further confirms the impropriety of the rejections.

None of the other cited references discloses or suggests the use of phosphate or phosphonate ions in any amount. Thus, the other cited references do not supply the missing disclosure of the Huynh et al. '237 patent. For the foregoing reasons, the Section 102(e) rejection of claims 24-27 is improper and should be withdrawn.

In re Appln. of Fang et al.
Application No. 09/595,227

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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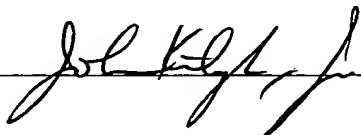
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CERTIFICATE OF MAILING

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Fang et al.

Application No. 09/595,227

Art Unit: 3723

Examiner: H. Shakeri

Filed: June 16, 2000

For: METHOD FOR POLISHING A
MEMORY OR RIGID DISK WITH
A PHOSPHATE ION-
CONTAINING POLISHING
SYSTEM

**AMENDMENTS TO SPECIFICATION AND CLAIMS
MADE IN RESPONSE TO OFFICE ACTION DATED SEPTEMBER 25, 2001**

Amendments to the existing specification at page 2, lines 17-27:

The present invention provides a method of planarizing or polishing the surface of a memory or rigid disk, as well as a polishing system useful in such a method. The method comprises contacting the surface of a memory or rigid disk with a polishing system comprising (i) a polishing composition comprising water, an oxidizing agent, and about 0.04 M or higher phosphate ion or phosphonate ion, and (ii) abrasive material, and abrading at least a portion of the surface of the memory or rigid disk by movement of the polishing system relative to the surface of the memory or rigid disk. Such contacting and abrading can take place by any suitable technique. For example, the polishing system can be applied to the surface of the memory or rigid disk and used to abrade at least a portion of the surface of the memory or rigid disk through use of a polishing pad.

Amendments to existing claims:

17. The method of claim [1] 2, wherein the phosphate ion is derived from a water-soluble phosphate.

19. The method of claim [18] 17, wherein the phosphate ion is derived from a source of phosphate ion [is] selected from the group consisting of ammonium phosphate, potassium phosphate, sodium tripolyphosphate, and mixtures thereof.

20. The method of claim [1] 3, wherein the phosphonate ion is derived from a source of phosphonate ion selected from the group consisting of amine-containing phosphonates, imine-containing phosphonates, imide-containing phosphonates, amide-containing phosphonates, phosphonate compounds containing no nitrogen, and mixtures thereof.

21. The method of claim [20] 3, wherein the phosphonate ion is derived from a source of phosphonate ion [is] selected from the group consisting of phosphoacetic acid, 2-aminoethyl dihydrogen phosphate, [2-aminoethyl dihydrogen phosphate,] aminotri-(methylenephosphonic acid), nitrilotris(methylene)triphosphonic acid, 1-hydroxyethylidene-1-diphosphonic acid, and diethylenetriaminepenta-(methylenephosphonic acid), and mixtures thereof.

28. The system of claim 24, wherein the polishing composition comprises 0.04 M or higher phosphate ion.

29. The system of claim 24, wherein the polishing composition comprises 0.04 M or higher phosphonate ion.

30. The system of claim 28, wherein the phosphate ion is derived from a water-soluble phosphate.

31. The system of claim 30, wherein the phosphate ion is derived from a source of phosphate ion selected from the group consisting of orthophosphates, polyphosphates, and mixtures thereof.

32. The system of claim 30, wherein the phosphate ion is derived from a source of phosphate ion selected from the group consisting of ammonium phosphate, potassium phosphate, sodium tripolyphosphate, and mixtures thereof.

33. The system of claim 29, wherein the phosphonate ion is derived from a source of phosphonate ion selected from the group consisting of amine-containing

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phosphonates, imine-containing phosphonates, imide-containing phosphonates, amide-containing phosphonates, phosphonate compounds containing no nitrogen, and mixtures thereof.

34. The system of claim 29, wherein the phosphonate ion is derived from a source of phosphonate ion selected from the group consisting of phosphoacetic acid, 2-aminoethyl dihydrogen phosphate, aminotri-(methylenephosphonic acid), nitrilotris(methylene)triphosphonic acid, 1-hydroxyethylidene-1-diphosphonic acid, diethylenetriaminepenta-(methylenephosphonic acid), and mixtures thereof.